CQ-TV

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THE BRITISH AMATEUR TELEVISION CLUB
FOUNDED 1949

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Some 4½" I.O. tubes are available, these are used but are in good order. Any interested members should contact the Hon. Secretary.

Transistors:- at 10/- a dozen. These are similar to OC180 but with wide spread of characteristics. These are available from Hon. Secretary while stocks last.

Flying Spot Scanner:- M. Cox has for sale a flying spot scanner. This uses a Ferranti 14" scanning tube with short after glow. The scanner is similar to the one described in CQ-TVno. 50.

Wanted:- 430Mc/s PA stage for use with QQV06/40A, lecher line prefered. G.V. Haylock, 28, Longlands Road, Sidcup, Kent.

A TRANSISTOR VIDEO AMPLIFIER

by P. Newbold.

The unit described will amplify standard 1v. d.a.p. video signals to the level required to drive directly the video output valve of a television receiver. (The receiver must be of the type using cathode modulation of the C.R.T.).

SPECIFICATION

input:1v. d.a.p. or less @ 75Ω
(no isolating capacitor).

output:150Ω approx.
(with isolating capacitor).

gain:prototype 15db. @ 3Mcs. bandwidth.

supply:15v. @ 20mA.

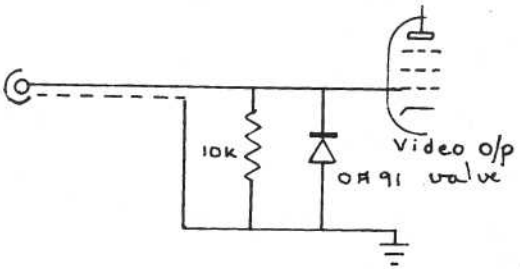
NOTES ON USE

1) The trimmer adjusts the H. F. response of the amplifier, and should be set so that the output has a just perceptible overshoot when a ½v. p-p square wave of about 50kcs. is put on the input.

2) To reduce the gain of the unit increase R2 as required. Beware that a reduction in R2, as well as increasing the gain, will also decrease the maximum input applicable before the onset of distortion.

3) Since the output is not at 75Ω any coax. at the output should be kept to a reasonable length to avoid attenuation of high frequencies. 6ft. was used on the prototype without noticeable deterioration in picture quality.

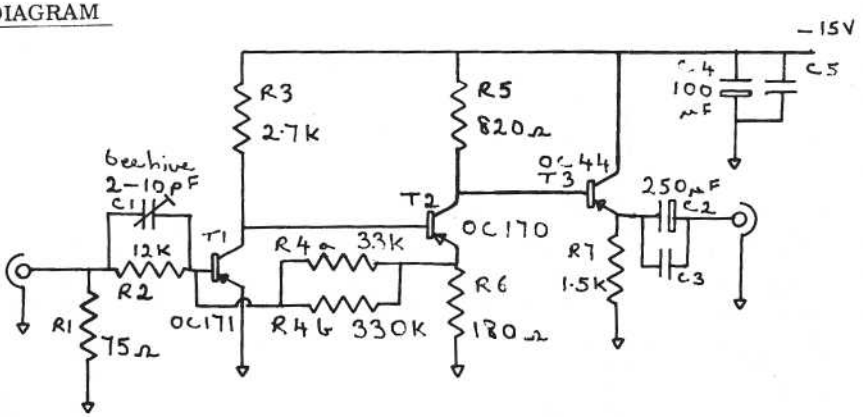
4) Connexion to the television is most easily effected by plugging the video output valve into its base via an adaptor, wiring through to all pins except the grid, which is brought out separately to a 6ft. length of coax. and a D.C. restoring network as shown below.

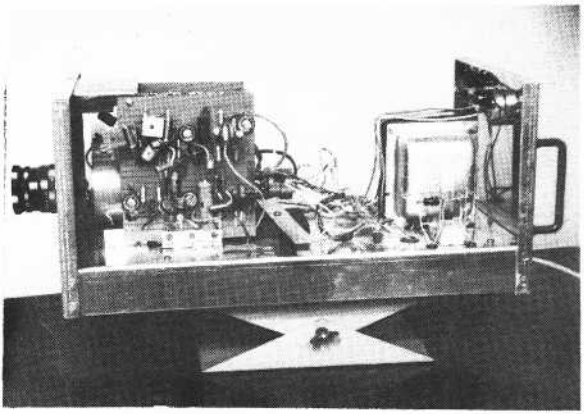


FINAL IMPORTANT NOTE

Don't forget that a television set operated in this way will need an isolating transformer.

CIRCUIT DIAGRAM

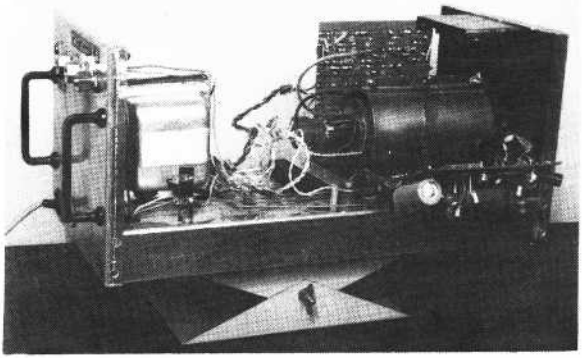




A SLOW-SCAN VIDICON CAMERA

C. Grant DIXON.

This vidicon camera was designed for the express purpose of recording pictures on tape, and because of this the standards adopted are not the same as those used by Cop Macdonald and others in the U.S.A. A line frequency of 50 cycles and a 'read-out time' of about $3\frac{1}{2}$ secs gives a good picture with a fair amount of detail as will be seen in the photo As the signal is frequency modulated, this helps to get rid of spurious signals due to irregularities in the magnetic coating of the tape.



The vidicon used is a 7290 which has a special high-resistance target, enabling it to give a reasonable video signal with the slower scanning speeds. An ordinary vidicon plugged into this camera will perform .....but only just!!!

The scanning circuits are straightforward .....a multivibrator is used to discharge a capacitor which has been charged through a constant current npn transistor (S_4 or S_{11}). This is analogous to the use of a pentode for capacitor charging in valve circuits, and a very linear waveform is obtained. The capacitor is D.C. coupled to an emitter follower (S_5 or S_{12}) and this feeds the output transistors, connected as a long-tailed pair which drive the 200 ohm deflector coils. Both sets of scanning coils are identical and the time-base through a capacitor and use OC72's for the output stage. The frame output is directly coupled and uses 2N1304's .... Texas transistors.

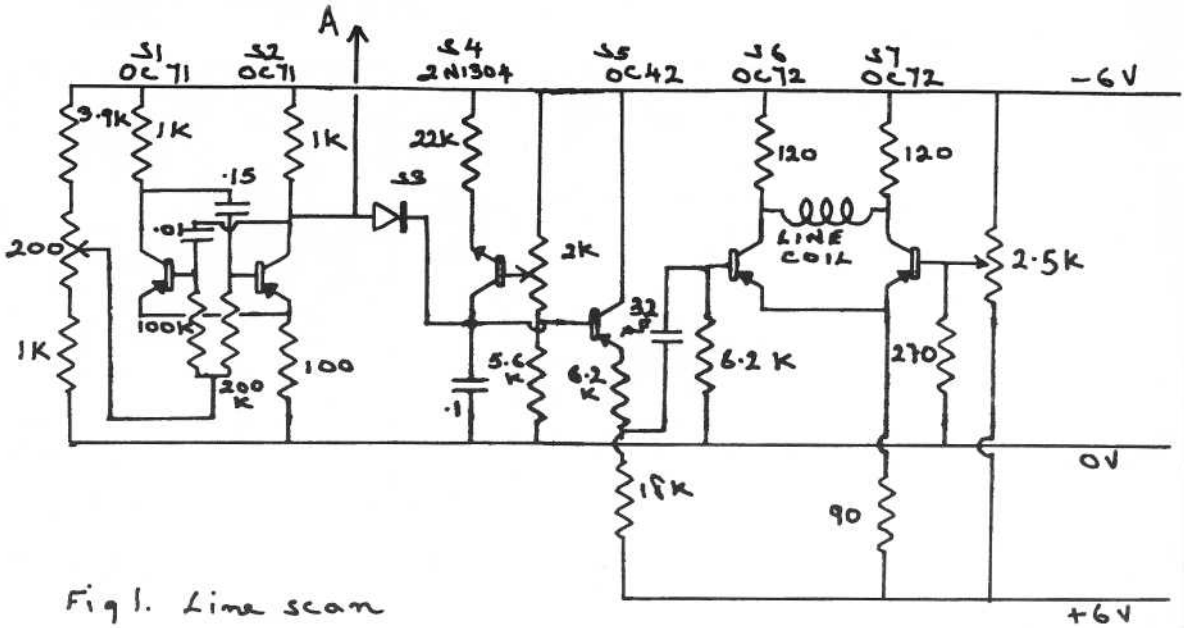


Fig 1. Line scan

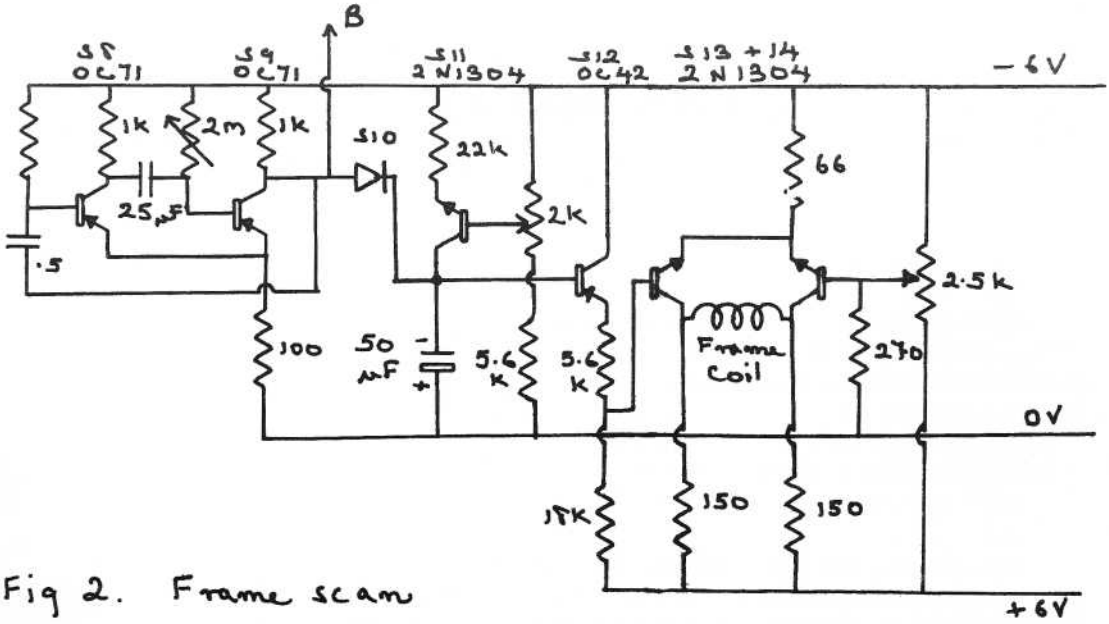
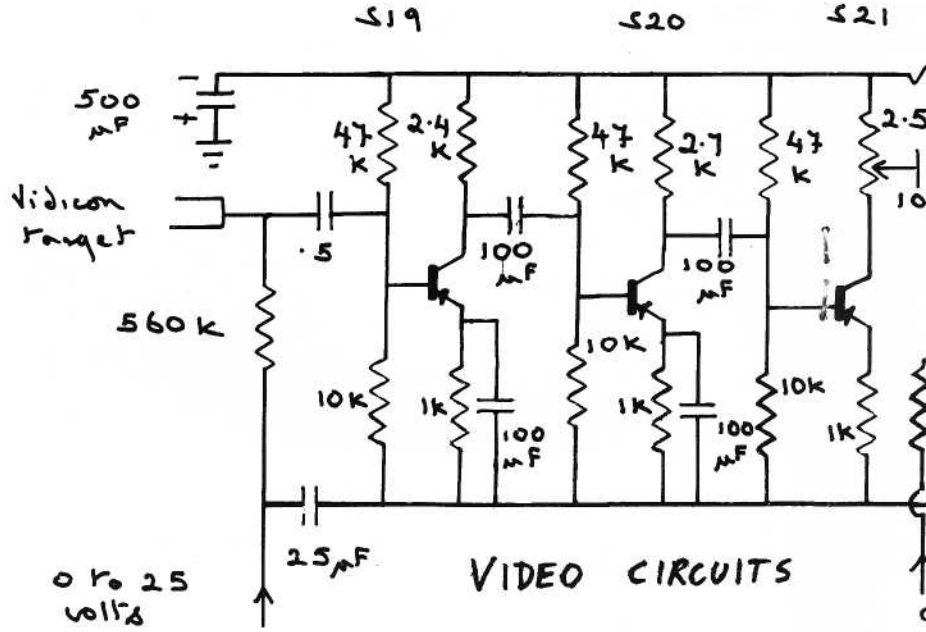


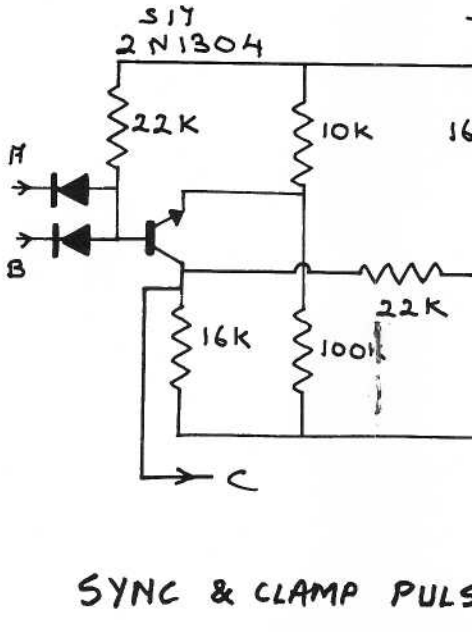
Fig 2. Frame scan



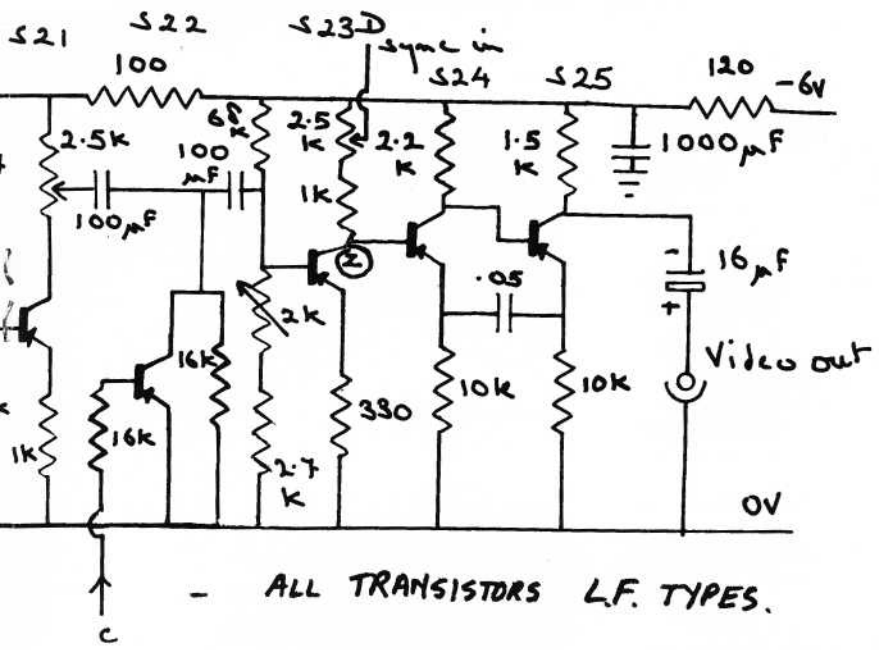
The "video" side of the camera is still in the experimental stage and can probably be improved upon. As we are dealing with audio waveforms, ordinary LF transistors can be used throughout. Ideally we should have a D.C. coupled amplifier, or at least some sort of D.C. clamp to restore the L.F. part of the waveform. In practice it has been found adequate to use very large coupling capacitors between the stages, but a D.C. clamp (S_{22}) has been used to clean up the waveform during the flyback period as there is no blanking applied ot the tube. This appears to work satisfact - orily and there remains only the minor irritation of the black frame flyback line on the monitor picture.

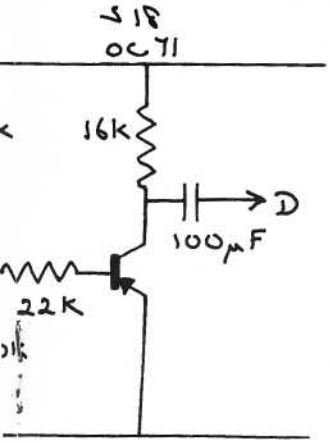
Sync. and video are mixed in the collector circuit of S_{23} and the potential at point Z produces frequency modulation of the master oscillator ... S_{24} & S_{25}. There is plenty of video gain in hand and hence the emitter resistor of S_{21} is not by-passed. It might even be possible to replace the first three stages with a single high-gain stage, but this has not been tried.

No circuits are given for the vidicon as these are conventional, but it should be noted that the 7290 vidicon has a maximum value of 25 volts for the target and the usual operating voltage is 15 volts. The wall



SYNC & CLAMP PULS





PULSE CIRCUITS

anode is usually run at 200 volts and the grid at - 45 volts. Adjustment of these values is very tedious at $3\frac{1}{2}$ secs. per frame!!

With regard to the monitor for viewing the pictures, this is substantially the same as has been described previously in CQ-TV for A.M. use, with the addition of an F.M. decoder. The signal from the camera or tape recorder is clipped by a 2-stage voltage amplifier (12AX7) running at low anode volts, and this is then passed to a valve in whose anode load there is a frequency discriminating circuit ..... See Cop Macdonald's article in "QST" for March 1964. The output is then a signal which is both A.M. and F.M. and it is passed through the monitor as a normal A.M. signal. It is possible that a much better picture would result if the monitor were designed from scratch for the F.M. system with a pulse-counter discriminator in the last stage feeding the CRT.

Finally, I would welcome any further suggestions for improvements and would like to swap tapes with anyone who builds the camera ... $3\frac{3}{4}$"/sec .... 4 tracks.

VKR 500

A REVIEW BY GRANT DIXON

The VKR 500 video tape recorder is marketed by Wesgrove Electrics Ltd., Nash House, New Street, Worcester as a Kit of parts at a price of £97.10s.0d. Comparing this price with the £1000 or so which is being asked for the cheapest video tape machine available so far, one immediately suspects that results will be considerably below standard. Let me say at once that I was pleasantly surprised by the picture quality of the demonstration tape which I was shown. The claimed frequency response is 2Mc/s and it seemed very probable that this was attained in the picture. A full technical specification of the machine is appended, but there are a number of extra points which it will be convenient to list:-

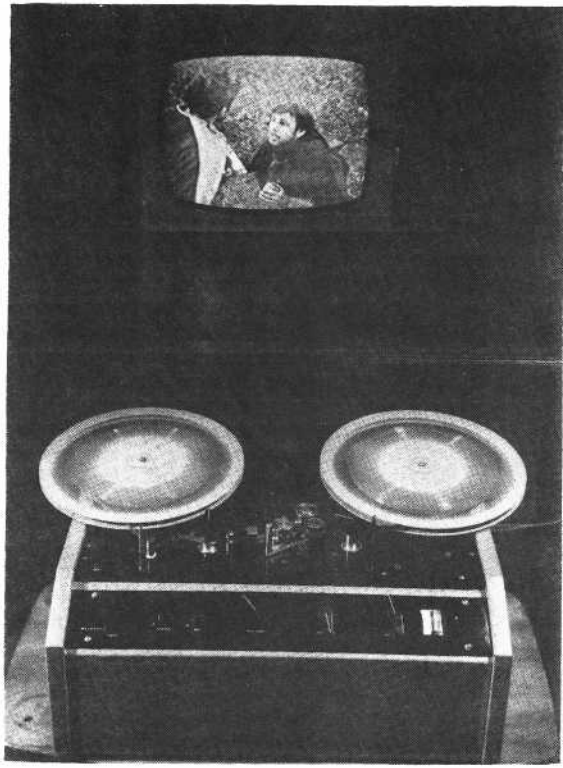
1. Permanent magnet erase and D.C. bias are used; obviously, R.F. bias is out of the question when recording up to 2Mc/s.

2. The video track is on the outer side of the tape and is 70 mils wide. The sound track is 20 mils wide and is situated towards the centre of the tape. The combined recording is 'half-track', so pictures and sound may be recorded on both sides of the tape.

3. The sound is recorded on an F.M. carrier and the quality seemed excellent.

4. The wear on the video head is considerable and heads have a life of about 100 hours. To combat this, a special turnover head has been developed which is merely reversed when the life of one side has expired. For maximum H.F. response there is a fine adjustment in azimuth of the video head.

5. The video signal is predistorted before recording and the reverse distortion is applied after playback. A special technique of sync. pulse recovery and reinsertion gives an extremely stable picture.



6. The tape spools carry 10,000 ft. of triple play tape and at the speed of 12.5ft/sec. necessary to give a 2Mc/s response this gives just over 13½ mins. of playing time on each side of the tape. At the 7.5 ft/sec. speed the response is only 1Mc/s and the picture quality is acknowledged to be poor.

7. The machine is entirely transistorised and contains 22 silicon transistors, 2 Germanium transistors and 6 diodes. All components including switch contacts are on a single printed circuit panel. Previously the deck was sent out as a kit of parts, but as constructors experienced difficulty in mechanical assembly of the decks, these are now sent out as assembled units.

My chief criticism of the recorder is that it appears to be slightly more difficult to thread than a normal sound recorder; also it does not take kindly to splices in the tape which make a louder 'bump' in the sound channel than one usually hears when recording sound. On the picture this occasionally showed as loss of sync. but some splices left the picture undisturbed. There was a steel tension spring in the model I was shown which looked as if it could cause a lot of tape wear.

Obviously, the recorder is being continually improved and the electronic side of the work is in the hands of an engineer who was formerly working on the B.B.C.'s 'VERA' project. The administration is in the hands of Mr. J. Jones who was formerly associated with the 'TELCAN' project of the Nottingham Electronic Valve Co. He was quick to point out, however, that the VKR500 is not a resuscitated Telcan machine but a much better machine in many respects.

Briefly, here is a video recorder in kit form for those who can put down £97.10s.0d. and are satisfied with a reasonable quality, 2Mc/s picture To get a picture on tape approaching broadcasting standards will need a better machine ..... about £900 better!

SPECIFICATION

Size ..... 20" x 10.7" x 7.7".

Weight ..... 28 lbs.

Mains ..... 200 - 240 volts 50 cycles
109 - 117 volts 60 cycles

Max. Power consumption .....200 watts.

Speeds ..... 7.5; 10.0; 12.5 ft/sec.

Frequency spectrum recorded at 12.5 ft/sec. .... 1 Kc/s to 2Mc/s

Spool size .. 11.5" maximum.

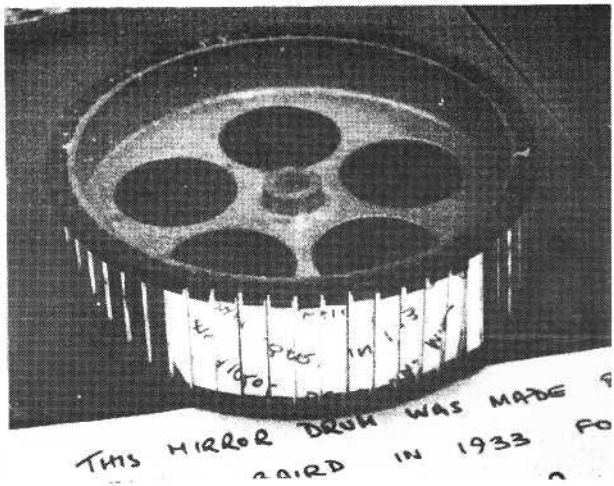
Input ..... 1 volt D.A.P. vision

Output .... 4 volts D.A.P. vision

Sound ..... FM carrier system. Response 50-10,000 cycles.

Sound input. 1 volt R.M.S.

Sound input. 1 volt R.M.S.



BAIRD SCANNING WHEEL

As you will remember we published a puzzle picture in our last edition of CQ-TV. Gordon Sharpley gives you the answer.

The drum is one of a pair, transmitting and receiving, which are on more or less permanent loan to the club from G2UF of Manchester.

G2UF was the first amateur to be given permission to transmit television (30 line type) on the 10 metre amateur band about 1928, I think he still has the original correspondence with the G.P.O. He gave several demonstrations around the North West including some transmissions from Blackpool.

The drum itself is for 60 lines made by Baird's company at Long Acre about 1934 when the E.M.I./ Baird struggle began. Baird went from 30 to 60 lines and then 90, 120 and 180 lines. This standard was very short lived and probably that is how the equipment reached G2UF. It is beautifully made individual flats, being milled on at the varying angles for each mirror. The mirrors are still in good condition and are held on by 240 6 BA screws in tapped holes (quite a job in itself!). Shining the beam of a torch onto it and rotating it still produces an immaculate raster complete with rapid field or should I say horizontal flyback!

I suppose if someone still had the time and effort a 60 line system could be resurrected from these drums!

TELEVISION DEMONSTRATION AT LOUGHTON

During November 1964, members of the B.A.T.C. took part in an experiment in community television at Loughton Hall Essex. Three image orthicon camera channels were in the studio with a vidicon telecine and flying spot scanner set up in the control room. All channels were previewed on monitors arranged in front of the vision mixer control panel. The outgoing pictures were distributed round the building to several 27" monitors.

The image orthicon cameras were supplied by Jim Brett, Terry Lane and Martin Lilly. The vidicon camera used on the 8 m.m. telecine was supplied by Andrew Tucker and showed films specially made for the experiment by an amateur cine group. The flying spot slid scanner and sync gererator were supplied by Dick Crook and the vision mixer by Martin Lilly.

The experiment lasted three days with programmes in the afternoon and evening directed by an ex-Rediffusion director, ably assisted by an ex-professional vision mixer, Part of the programme was recorded on a Precision Instruments video tape machine for showing at a later performance and on one occasion for an insert in the evening programme.

The sound system was in the hands of the local radio club and was technically the least successful part of the system in comparison with the vision equipment which operated faultlessly for the full three days.

I would like to take this opportunity of thanking all members of the B.A.T.C. who loaned equipment and assisted with the setting up and operation of the equipment.

Dick Crook

GREENFORD RADIO SOCIETY LECTURE

The third 'over the air' lecture from G6NDT/T was given on Friday, 12th February, when John Tanner addressed G3MMQ/A which was at a meeting of the Greenford Radio Society. The subject was 'Amateur Television' and the lecture covered the progress of the television signal from the camera to the transmitter with some added discussion on camera tubes. A novel feature was a 16 m.m. film of the aerial system at G6NDT/T shot specially for the lecture by Ian Howell. This was negative film reversed electronically. At the transmitting end a crowd of helpers, including G6ABA/T who kindly brought his new vidicon camera, manned the station; while John Ware and Dave Mann installed and operated the receiver, kindly provided by the Greenford Club. A two metre talk-back link enabled continuous communication and made the whole event much easier to control. After the talk the crew assembled at Greenford to conclude the meeting ..... and then adjourned for a 'quick half pint!' Tohn Tanner

'S' Meter readings/picture quality

Ian Waters has prepared a chart comparing 'S'meter readings, signal to noise ratio and subjective assessment of picture quality. In doing so he made the following assumptions:-

1) One 'S' point equals 6dB.

2) S9 is just noise free on a communications receiver with a 4 Kc/s bandwidth(i.e. AR88 on selectivity position 2) with the gain adjusted for comfortable listening to 100% modulated 'phone signal.

3)The 405 line television is used with a receiver having a single sideband IF response -3dB at 2.5Mc/s.

4) The same Rf front end, aerial, Rf amplifier, mixer etc. are common to both systems.

This chart can be useful to those who are wondering what picture quality they may expect from an amateur station and have only sound equipment to assess the signal strength. It can be seen from the chart that a considerably stronger signal is required to give acceptable picture quality. A signal path giving good sound quality may only just give acceptable picture quality.

Cover Photo

Shows the control room for the Loughton Demonstration. TheCCU's and vision mixer control panel are in the foreground. Andrew Tucker inspects the situation.

'S' Meter	Ratio of peak noise voltage to peak signal voltage	Subjective assessment of Picture Quality
less than S7	Peak noise greater than peak signal	No picture resolv by normal receiver
S7	80%	Picture may just lock unviewable
S8	40%	Very noisy, pictures of bold objects just viewable. Resolution limited by noise less than 100 lines.
S9	20%	Noisy but viewable. Resolution limited by noise to about 300 lines
S9 + 10dB	6%	Some noise acceptable quality
S9 + 20dB	2%	Noise only just discernable. Good quality
S9 plus more than 20dB	Difficult to measure with average equipment	Noise free Excellent quality

CQ TV